CLAIMS

1. A method of manufacturing an optical communication system including (i) an optical fiber and (ii) first and second modules respectively provided at both ends of the optical fiber, the first and second modules being capable of simultaneously sending and receiving optical signals via the optical fiber, wherein:

a position of the first module with respect to the optical fiber is determined in accordance with a receiving efficiency at the first module with respect to light emitted from the optical fiber; and

S1_ is set in accordance with a value of FR_ in the position so as to satisfy

(a) If IO≥0.3

$$\frac{(1-IO)}{0.7} > \frac{S\max * (\frac{NR}{R\min} + FR\_ * PT\max^2) + X * \frac{Namp}{R\min}}{S1\_ * PT\min}$$

(b) If IO<0.3

$$1 > \frac{S\max * (\frac{NR}{R\min} + FR\_ * PT\max^2) + X * \frac{Namp}{R\min}}{S1\_ * PT\min} \quad \ldots(1)$$

where FR_ is a far-end reflectivity, which is a reflectivity (a) of light emitted from the second module and (b) on the first module and on the first-module-side end of the optical fiber; S1_ is power of light coupled into the optical fiber from the first module; Smax is a maximum value acceptable in the optical communication system as a value

of the power of light coupled into the optical fiber; PTmin is a minimum value acceptable in the optical communication system as a transmittance of the optical fiber with respect to the optical signals; PTmax is a maximum value acceptable in the optical communication system as the value of the transmittance of the optical fiber with respect to the optical signals; NR is a ratio, with respect to Smax, of a stray light component received by the second module, the stray light component being generated on the second-module-side end of the optical fiber and in the second module when light to be coupled into the optical fiber with power of Smax is emitted from the second module; Rmin is a minimum receiving efficiency at the second module with respect to light emitted from the optical fiber; Namp is a light amount corresponding to a noise in an amplifier for converting, into an electric signal, an optical signal received by the second module; IO is an eye opening ratio required for the electric signal obtained by conversion through the amplifier; and X is a ratio, with respect to Namp, of an optical signal received by the second module when a bit error rate is in an upper limit value acceptable in the optical communication system, where it is assumed that there is no reflected light returning to the second module after being emitted from the second module.

2. A method of manufacturing an optical communication system including (i) an optical fiber and (ii) first and second modules respectively provided at both ends of the optical fiber, the first and second modules being capable of simultaneously sending and receiving optical signals via the optical fiber, wherein:

a position of the first module with respect to the optical fiber is determined in accordance with a receiving efficiency at the first module with respect to light emitted from the optical fiber; and

from plural groups of modules, the modules being different from group to group, a group in which S1min_ satisfies

(a) If IO≥0.3

$$\frac{(1-IO)}{0.7} > \frac{S\max*(\frac{NR}{R\min}+FR\_*PT\max^2)+X*\frac{Namp}{R\min}}{S1\min\_*PT\min}$$

(b) If IO<0.3

$$1 > \frac{S\max*(\frac{NR}{R\min}+FR\_*PT\max^2)+X*\frac{Namp}{R\min}}{S1\min\_*PT\min} \quad \ldots(2)$$

is selected in accordance with a value of FR_ in the position, and modules included in the selected group are used as the first module,

where FR_ is a far-end reflectivity, which is a reflectivity (a) of light emitted from the second module and (b) on the first module and on the first-module-side end of

the optical fiber; S1min_ is a minimum value among various values of power of light coupled into the optical fiber from a group of modules of a same kind adoptable as the first module; Smax is a maximum value acceptable in the optical communication system as a value of the power of light coupled into the optical fiber; PTmin is a minimum value acceptable in the optical communication system as a transmittance of the optical fiber with respect to the optical signals; PTmax is a maximum value acceptable in the optical communication system as the value of the transmittance of the optical fiber with respect to the optical signals; NR is a ratio, with respect to Smax, of a stray light component received by the second module, the stray light component being generated on the second-module-side end of the optical fiber and in the second module when light to be coupled into the optical fiber with power of Smax is emitted from the second module; Rmin is a minimum receiving efficiency at the second module with respect to light emitted from the optical fiber; Namp is a light amount corresponding to a noise in an amplifier for converting, into an electric signal, an optical signal received by the second module; IO is an eye opening ratio required for the electric signal obtained by conversion through the amplifier; and X is a ratio, with respect to Namp, of an optical signal received by the

second module when a bit error rate is in an upper limit value acceptable in the optical communication system, where it is assumed that there is no reflected light returning to the second module after being emitted from the second module.

3. A method of manufacturing an optical communication system including (i) an optical fiber and (ii) first and second modules respectively provided at both ends of the optical fiber, the first and second modules being capable of simultaneously sending and receiving optical signals via the optical fiber, wherein:

a position of the first module with respect to the optical fiber is determined in accordance with a receiving efficiency at the first module with respect to light emitted from the optical fiber; and

PT1_ is set in accordance with a value of FR_ in the position so as to satisfy

(a) If IO≥0.3

$$\frac{(1-IO)}{0.7} > \frac{S\max*(\frac{NR}{R\min}+FR\_*PT\max^2)+X*\frac{Namp}{R\min}}{S\min*PT1\_}$$

(b) If IO<0.3

$$1 > \frac{S\max*(\frac{NR}{R\min}+FR\_*PT\max^2)+X*\frac{Namp}{R\min}}{S\min*PT1\_} \qquad \ldots(3)$$

where FR_ is a far-end reflectivity, which is a reflectivity

(a) of light emitted from the second module and (b) on the first module and on the first-module-side end of the optical fiber; PT1_ is a transmitivity of the optical fiber with respect to light emitted from the first module; Smin is a minimum value acceptable in the optical communication system as a value of power of light coupled into the optical fiber; Smax is a maximum value acceptable in the optical communication system as a value of the power of light coupled into the optical fiber; PTmax is a maximum value acceptable in the optical communication system as a value of a transmittance of the optical fiber with respect to the optical signals; NR is a ratio, with respect to Smax, of a stray light component received by the second module, the stray light component being generated on the second-module-side end of the optical fiber and in the second module when light to be coupled into the optical fiber with power of Smax is emitted from the second module; Rmin is a minimum receiving efficiency at the second module with respect to light emitted from the optical fiber; Namp is a light amount corresponding to a noise in an amplifier for converting, into an electric signal, an optical signal received by the second module; IO is an eye opening ratio required for the electric signal obtained by conversion through the amplifier; and X is a ratio, with respect to

Namp, of an optical signal received by the second module when a bit error rate is in an upper limit value acceptable in the optical communication system, where it is assumed that there is no reflected light returning to the second module after being emitted from the second module.

4. A method of manufacturing an optical communication system including (i) an optical fiber and (ii) first and second modules respectively provided at both ends of the optical fiber, the first and second modules being capable of simultaneously sending and receiving optical signals via the optical fiber, wherein:

a position of the first module with respect to the optical fiber is determined in accordance with a receiving efficiency at the first module with respect to light emitted from the optical fiber; and

from plural groups of modules, the modules being different from group to group, a group in which PT1min_ satisfies

(a) If IO≥0.3

$$\frac{(1-IO)}{0.7} > \frac{S\max*(\frac{NR}{R\min}+FR\_*PT\max^2)+X*\frac{Namp}{R\min}}{S\min*PT1\min\_}$$

(b) If IO<0.3

$$1 > \frac{S\max*(\frac{NR}{R\min}+FR\_*PT\max^2)+X*\frac{Namp}{R\min}}{S\min*PT1\min\_} \quad \ldots(4)$$

is selected in accordance with a value of FR_ in the position, and modules included in the selected group are used as the first module,

where FR_ is a far-end reflectivity, which is a reflectivity (a) of light emitted from the second module and (b) on the first module and on the first-module-side end of the optical fiber; PT1min_ is a minimum value among various values of a transmittance of the optical fiber with respect to light emitted from a group of modules of a same kind adoptable as the first module; Smin is a minimum value acceptable in the optical communication system as a value of power of light coupled into the optical fiber; Smax is a maximum value acceptable in the optical communication system as a value of the power of light coupled into the optical fiber; PTmax is a maximum value acceptable in the optical communication system as a value of a transmittance of the optical fiber with respect to the optical signals; NR is a ratio, with respect to Smax, of a stray light component received by the second module, the stray light component being generated on the second-module-side end of the optical fiber and in the second module when light to be coupled into the optical fiber with power of Smax is emitted from the second module; Rmin is a minimum receiving efficiency at the second module with respect to light emitted from the

optical fiber; Namp is a light amount corresponding to a noise in an amplifier for converting, into an electric signal, an optical signal received by the second module; IO is an eye opening ratio required for the electric signal obtained by conversion through the amplifier; and X is a ratio, with respect to Namp, of an optical signal received by the second module when a bit error rate is in an upper limit value acceptable in the optical communication system, where it is assumed that there is no reflected light returning to the second module after being emitted from the second module.

5. The method of manufacturing an optical communication system as set forth in any one of claims 1 to 4, wherein:

the optical fiber is a plastic optical fiber.